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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/177,729	10/23/1998	DAVID S. TAUBMAN	10960578-1	3513

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EXAMINER

TRAN, NHAN T

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/177,729

Applicant(s)

TAUBMAN, DAVID S.

Examiner

Nhan T. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8-11, 15-23, 26, 27 and 29-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-11, 15-23, 26, 27, 30, 31, 33, 36 and 37 is/are rejected.
- 7) ☒ Claim(s) 29, 32, 34 and 35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/20/2004 has been entered.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 8-11, 15-23, 26-27, 30-31, 36-37 have been considered but are moot in view of the new grounds of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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3. Claims 18, 20, 26-27, 33, 36-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Yokota et al (US 5,905,530).

Regarding claim 18, Yokota discloses a method of generating a linear operator for demosaicing (linear interpolation) of a digital image by a digital camera (Figs. 1 & 2; col. 6, line 49 – col. 7, line 60, note that the image sensor 101 is a single image sensor; therefore demosaicing is also the interpolation), the method comprising:

accessing a parametric image capture description (accessing table 105 for distortion description; Fig. 2, step S 4; col. 6, lines 58-59 and col. 7, lines 24-34);  
measuring parameters of the camera (steps S2 & S3; col. 7, lines 6-23);  
using the parametric and the measured parameters to obtain coefficients of the linear operator (step S6; col. 56-60, wherein linear interpolation encompasses coefficients of the linear operator since in order for linear interpolation to function, coefficients of the linear interpolation must be obtained).

Regarding claim 20, Fig. 2 shows a flow chart of a computer program that is executed by the controlling circuit 102 to perform the method of claim 18.

Regarding claim 26, the linear interpolation as analyzed in claim 18 is to perform both interpolating (demosaicing) and compensation of image degradation (image distortion) by the digital camera.

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Regarding claim 27, Yokota discloses that the data indicative of the mount of distortion is memorized in form of raw data relative of each zoom position and each focus position (col. 7, lines 24-34). This implies scene illuminant spectral power density because lens distortion causes different scene illuminant spectral power density to be varied from point to point.

Regarding claim 33, it is seen that the linear interpolation is performed without use of *measured image samples*.

Regarding claim 36, see the analysis of claim 20, wherein computer memory encoded with the linear operator is inherent for storing instructions/codes for the controlling circuit 102 to execute the instruction shown in Fig. 2.

Regarding claim 37, see the analysis of claim 36 and digital camera shown in Fig. 1.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8-9, 15-17, 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober et al (US 5,475,769) in view of Yokota et al (US 5,905,530).

Regarding claim 8, Wober discloses a method for processing an input digital image produced by an optical system, the input image having less than full color information at each of a plurality of pixels (Fig. 2), the method comprising:

accessing an operator including an array of demosaicing weights, and applying the operator to the input image to produce an output image having a full color information at each of a plurality of pixels. See col. 2, lines 18-35; col. 3, lines 61 – col. 4, line 30 and col. 5, lines 1-65.

Wober does not teach that values of the weights are determined from measured parameters of the optical system and a model of the optical system. However, Wober suggests that the accuracy of the coefficients to interpolate color values depends on the amount of overlap between spectral sensitivity ranges of the individual color filter elements in the mosaic pattern *as well as the amount of lens blurring* and the actual arrangement of the color filter within the mosaic pattern, and if the residual error is found to be unacceptable then any of the aforementioned parameters can be adjusted either alone or in combination to reduce the residual error (Wober, col. 7, lines 14-22). In other reference, Yokota teaches that a linear interpolation of a color image is implemented by taking measured parameters of an optical system (i.e., zoom data, focus data) and a model of the optical system (i.e., distortion model of the lens; Figs. 6-12) into consideration to produce a higher quality image. See Yokota, Fig. 2; col. 7, lines 5-60 and col. 15, lines 40-45.

Therefore, it would have been obvious to one of ordinary skill in the art to modify Wober to include measured parameters of the optical system and a model of the optical system in calculation of values of the weights so that image quality would be highly improved.

Regarding claim 9, see the analysis of claim 8 for compensation for lens blurring or lens distortion.

Regarding claims 15 & 16, also disclosed in the combination of Wober and Yokota is an article for a processor, the article including computer memory with instructions for causing the processor to perform method of claim 8. See Wober, Figs. 5-7 and Yokota Figs. 1 & 2.

Regarding claim 17, Wober further discloses that the digital camera further comprises memory for storing a plurality of candidate of operators; and wherein the processor is programmed to access the operator by selecting the operator from one of the plurality of candidates (col. 4, lines 20-28 and col. 7, lines 33-40).

Regarding claims 21 & 22, see the analyses of claims 9 & 17, respectively.

Regarding claim 23, Wober further discloses that the operators are included in T-matrices (Transformation matrices) since the data is transformed from pixels with missing color information into pixels with color information (Wober, col. 4, lines 11-30; col. 5, lines 1-65 and col. 8, lines 23-30).

5. Claims 19, 30 & 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokota et al (US 5,905,530) in view of Wober et al (US 5,475,769).

Regarding claim 19, Yokota is silent about a standard noise model and a linear minimization technique to be used to generate the coefficients. As taught by Wober, it is well known to use test noise pattern and linear minimization technique to generate interpolation coefficients for recovering missing color information at each pixel (Wober, col. 6, lines 7-27).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Yokota with Wober to generate coefficients for color interpolation using a well known standard noise and a linear minimization technique to reproduce a better output image with less noise.

Regarding claims 30 & 31, see the analyses of claims 19 & 27.

6. Claims 10 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober et al and Yokota et al as applied to claim 8 and in further view of Acharya (US 6,348,929).

Regarding claim 10, the combination of Wober and Yokota discloses a method of processing an input digital image produced by an optical system as discussed above, but Wober and Yokota do not specifically disclose the step of applying the operator includes forming of a plurality of input vectors from the input image, each input vector formed from super pixels, and



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applying the operator to the input vectors. Acharya teaches a scaling algorithm and architecture for scaling an image wherein each input vector is formed from super pixels (col. 4, line 62 – col. 5, line 3 and col. 6, lines 49-60).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Wober and Yokota to include each input vector that is formed from super pixels in a manner taught by Acharya to provide an output of varying resolution in a well-known method in the art.

Regarding claim 11, the combination of Wober, Yokota and Acharya further includes the operator being used for different resolutions and a resulting fixed resolution image is resampled (see Acharya, col. 6, line 56 – col. 7, line 13).

### ***Allowable Subject Matter***

7. Claims 29, 32, 34 & 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to teach or fairly suggest the limitations required in each of claims 29, 32, 34 & 35.

### ***Conclusion***

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (703) 605-4246. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Thai Tran can be reached on (703) 305-4725. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NT.



THAI TRAN  
PRIMARY EXAMINER